REMARKS

Claims 4, 14, 38-54 and 56 were previously canceled, without prejudice. Claim 1, 7-8, 20, 23-24, and 33-34 have been amended. Claims 32, 35-37 and 55 have been canceled, without prejudice. Applicant reserves the right to pursue the original claims and other claims in this and other applications. In view of the amendments to the claims and the remarks below, Applicant respectfully requests that the rejections be withdrawn and the claims allowed.

Claims 7, 23-24 and 33-34 stand objected to as being dependent upon a rejected base claim. Claims 7, 23-24 and 33-34 have been rewritten in independent form including all of the limitations of the respective base claims and any intervening claims. Accordingly, Applicant respectfully requests that the objection be withdrawn and these claims allowed.

Claims 1-3, 5-6, 8-9 and 11-12 stand rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Publication No. 2002/0171077 to Chu et al. ("Chu"). The rejection is respectfully traversed.

Independent claim 1 has been amended to include limitations similar to the allowable subject matter of claim 7. The Examiner has recognized that "[t]he prior art fails to anticipate or render obvious the claimed limitations including: 'wherein the first layers are not in direct contact with one another and the second layers are not in direct contact with one another' in combination with 'a graded buffer layer beneath a bottom layer of the photodiode' and in combination with 'wherein the layers of Si are doped to a first conductivity type, wherein the layers of SiGe are doped to a second conductivity type, and wherein the first conductivity type is different from the second conductivity type.'"

Accordingly, claim 1, as amended, recites a pixel cell for an image sensor comprising, among other elements, a photodiode "wherein the first layers are not in direct contact with one another and the second layers are not in direct contact with one another," and "wherein the first layers are doped to a first conductivity type, wherein the second layers are doped to a second conductivity type, and wherein the first conductivity type is different from the second conductivity

type." Claim 1 also recites "a graded buffer layer beneath a bottom layer of the photodiode." Nothing in Chu teaches or suggests these limitations of claim 1, and none of the prior art cited in the Office Action, even when considered in combination, teaches or suggests these limitations. For at least these reasons, claim 1 is allowable and the amendments to claim 1 do not require an additional search. Claims 2-3, 5-6, 8-9 and 11-12 depend from claim 1 and are allowable for at least the same reasons that claim 1 is allowable.

With respect to claim 8, the Office Action (at 18) also states that "in claim 8 the recitation of 'at least a first subset of layers' and 'at least a second subset of layers' is not claimed in a matter to link the recitations to the earlier recited 'layers' as claimed." Claim 8 has been amended to address the issue raised in the Office Action. Accordingly, Applicant respectfully requests that claim 8 be allowed.

Claims 10 and 13 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Chu in view of U.S. Patent No. 5,818,322 to Tasumi ("Tasumi"). The rejection is respectfully traversed.

Claims 10 and 13 depend from claim 1. As discussed above, Chu fails to teach or suggest all of the elements of independent claim 1. Tasumi relates to a waveguide and the Office Action (at 5) cites Tasumi as teaching a pixel cell where the first layer is $Si_xGe_{1-x}C_y$, the second layer is $Si_xGe_yC_z$ and each of the layers have a thickness of approximately 50-300 angstroms. Tasumi, even when considered in combination with Chu, does not supplement the deficiencies of Chu. For at least these reasons, claims 10 and 13 are allowable.

Claims 15-22, 25 and 27-31 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Chu in view of U.S. Patent No. 6,232,626 to Rhodes ("Rhodes"). The rejection is respectfully traversed.

Claims 15-19 depend from claim 1. As discussed above, Chu fails to teach or suggest all of the elements of independent claim 1. The Office Action (at 6-7) cites Rhodes as teaching: a

photodiode including a reset and transfer transistor, using photodiodes in a CMOS image sensor and in a CCD image sensor, and an SOI substrate. Rhodes, even when considered in combination with Chu, does not supplement the deficiencies of Chu. For at least these reasons, claims 15-19 are allowable.

Independent claim 20 has been amended to include the allowable subject matter of claim 34. The Examiner has recognized that "[t]he prior art fails to anticipate or render obvious the claimed limitations including: 'wherein the first layers are not in direct contact with one another and the second layers are not in direct contact with one another' in combination with 'wherein first and at least second subsets of the layers are doped to first and second conductivity types, respectively, and wherein the first conductivity type is different than the second conductivity type.'"

Accordingly, claim 20, as amended, recites an image sensor comprising, among other elements, an array of pixel cells at a surface of a substrate, wherein at least one of the pixel cells comprises a photodiode "wherein the first layers are not in direct contact with one another and the second layers are not in direct contact with one another," and "wherein first and at least second subsets of the layers are doped to first and second conductivity types, respectively, and wherein the first conductivity type is different than the second conductivity type." Further, nothing in Chu and none of the prior art cited in the Office Action, even when considered in combination, teaches or suggests these limitations of claim 20. For at least these reasons, claim 20 is allowable.

The Office Action (at 8) cites Rhodes as teaching "an array of pixel cells at a surface of a substrate, wherein at least one of the pixel cells comprises the photodiode." Rhodes, even when considered in combination with Chu, does not supplement the deficiencies of Chu. For at least these reasons, claim 20 is allowable and the amendments thereto do not require an additional search. Claims 21-22, 25 and 27-31 depend from claim 20 and are allowable for at least the same reasons that claim 20 is allowable.

Claim 26 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Chu in view of Rhodes and Tasumi. The rejection is respectfully traversed.

Claim 26 depends from claim 20. As discussed above, the Chu and Rhodes combination fails to teach or suggest all of the elements of independent claim 20. The Office Action (at 14) cites Tasumi as teaching a pixel cell where the first layer is $Si_xGe_{1-x}C_y$ and the second layer is $Si_xGe_yC_z$. Tasumi, even when considered in combination with Chu and Rhodes, does not supplement the deficiencies of Chu and Rhodes. For at least these reasons, claim 26 is allowable.

The Director is hereby authorized to charge any deficiency in the fees filed, asserted to be filed or which should have been filed herewith (or with any paper hereafter filed in this application by this firm) to our Deposit Account No. 04-1073, under Order No. M4065.0674/P0674.

In view of the above, Applicant believes the pending application is in condition for allowance.

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Respectfully ~~submitted~~,

By_____

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